

APPLICANT

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TITLE OF THE INVENTION

Auto Adjustment Video Projector (AAVP)

CROSS-REFERENCES TO RELATED APPLICATIONS

This application claims the benefits of provisional patent application No 60/158,060, filed October 7, 1999 entiteled "Picture to Picture Pointer, White Shadow and Auto Adjustment Projector".

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

"Not applicable"

REFERENCE TO A MICROFICHE APPENDIX

"Not applicable"

BACKGROUND OF THE INVENTION

1-Field of the Invention:

The present invention relates to video projector technologies.

2-Description of the related art:

Before using a video projector, it is necessary to set its focus, lightness, contrast and color saturation. These settings are made easy when the projection

room and screen are designed adequately. When the video projector and the screen are fixed, these adjustments are usually made once (at the installation).

With portable video projectors, projection conditions (room darkness, quality of the projection screen, projection distance,...) may vary from a presentation to another. The user has to adjust his device (the projector) in order to optimize the projection quality: he has to set the focus according to the available projection distance and the screen size and he has to adjust the brightness, the contrast and the color saturation depending on the projection room and screen.

The disadvantage of portable video projectors is the necessity of the setting phase prior to every new projection, when the projection conditions are changed.

#### BRIEF SUMMARY OF THE INVENTION

The principal of this invention is to make the video projector adjustments (focus, brightness, contrast and color saturation) automated. The video projector will be able to detect the projection conditions (distance to the screen, screen quality, room darkness,...) and to set the optimal setting parameters in order to allow the best quality of projection in those conditions.

The projection conditions will be quantified by the mean of a detecting device (CCD camera for example) integrated to the video projector.

#### BRIEF DESCRIPTION OF DRAWINGS

FIG.1 illustrates the principle of the Auto-Adjustment Video Projector: a capture device (CCD camera) allows to read the projection screen conditions in order to set automatically the projector.

## DETAILED DESCRIPTION OF THE INVENTION

Video projector will be equipped with a video camera that shoots back the projection screen (during an initialization phase). The video image of the screen will be interpreted to extract the informations describing the screen conditions, the projection distance and the room conditions (darkness and noise light).

These condition informations will be used to set the different adjustment parameters (focus, brightness, contrast and color saturation):

### Auto focus:

In addition to the capture system (CCD video camera), the video projector will be equipped by a motorized projection lens. The auto focus system (Hardware system integrated to the video projector) controls the motorized projection lens in order to obtain the best possible setting. A feed back loop composed by the capture device (CCD camera), the auto-focus Hardware and the motorized projection lens operates to converge to the optimal focus value.

The projector sends to the projection screen a sequence of test signals (lines, circles, or others...). The capture device (CCD camera) reads back these test signals and sends their video signal to the auto focus system to process them and command the motorized projection lens accordingly. The best focus setting is obtained when the projected image (of test signals) is closer to the received screen (received by the capture device : CCD camera).

### Auto-Brightness:

The capture device in the video projector scans the projection screen and analyses its reflection characteristics in order to set the right brightness. Also the

ambient noise light (the room light) is measured and involved in the computation of the brightness parameters. The control of the brightness can be made pixel by pixel. Psycho visual considerations are involved in the algorithm.

#### Auto-contrast:

The captured screen informations are used to determine the optimum contrast value to apply so that the viewers get the finest quality of projection for any particular conditions. The control of the contrast can be made pixel by pixel.

#### Auto-color saturation:

The projection screen may not be always perfectly neutral: some parasite colored reflections (colored windows or door glass, reflection on colored wall...) can give the screen a tint of some color. The presentation will be affected and the screen stain will distress the audience. Although the human eyes restore this effect (after the beginning of the presentation), it is still worthwhile to recover the screen from the video projector by neutralizing the noise lights on it. This will release the viewer eyes and make them more comfortable. The control of the color saturation is made pixel by pixel.

#### CLAIMS

1- A method to make the video projector settings (focus, Brightness, contrast, color saturation and others ...) automated.

2- A method that uses a capture device (CCD camera for example) to set automatically the video projector adjustments.

3. A method, where a camera integrated to the video projector shoots back the video projection screen and where the video signal from this camera is used as well for any function other than the auto-adjustment function.

4. A method as recited in claims 1 and 2, to be used in portable or fix video projectors.

5. A method as recited in claims 1 and 2, to be used with all video projection technologies.

6. A method, where any sensor or detector (other than a video camera) integrated to the video projector is used to read back the projection screen or the space between the screen and th projector.

7. A method of scanning the projection screen or the space between the projector and the screen by using a video camera (or any sensor or detector) in order to process the projected video signal or to extract informations from the projection screen scene.

#### ABSTRACT OF THE DISCLOSURE

Ther present invention allows setting video projectors (Focus, Brightness, Contrast, Color saturation ...) automatically. It is based on the analysis of the projection screen conditions obtained from the screen image captured by an integrated video camera in the video projector.